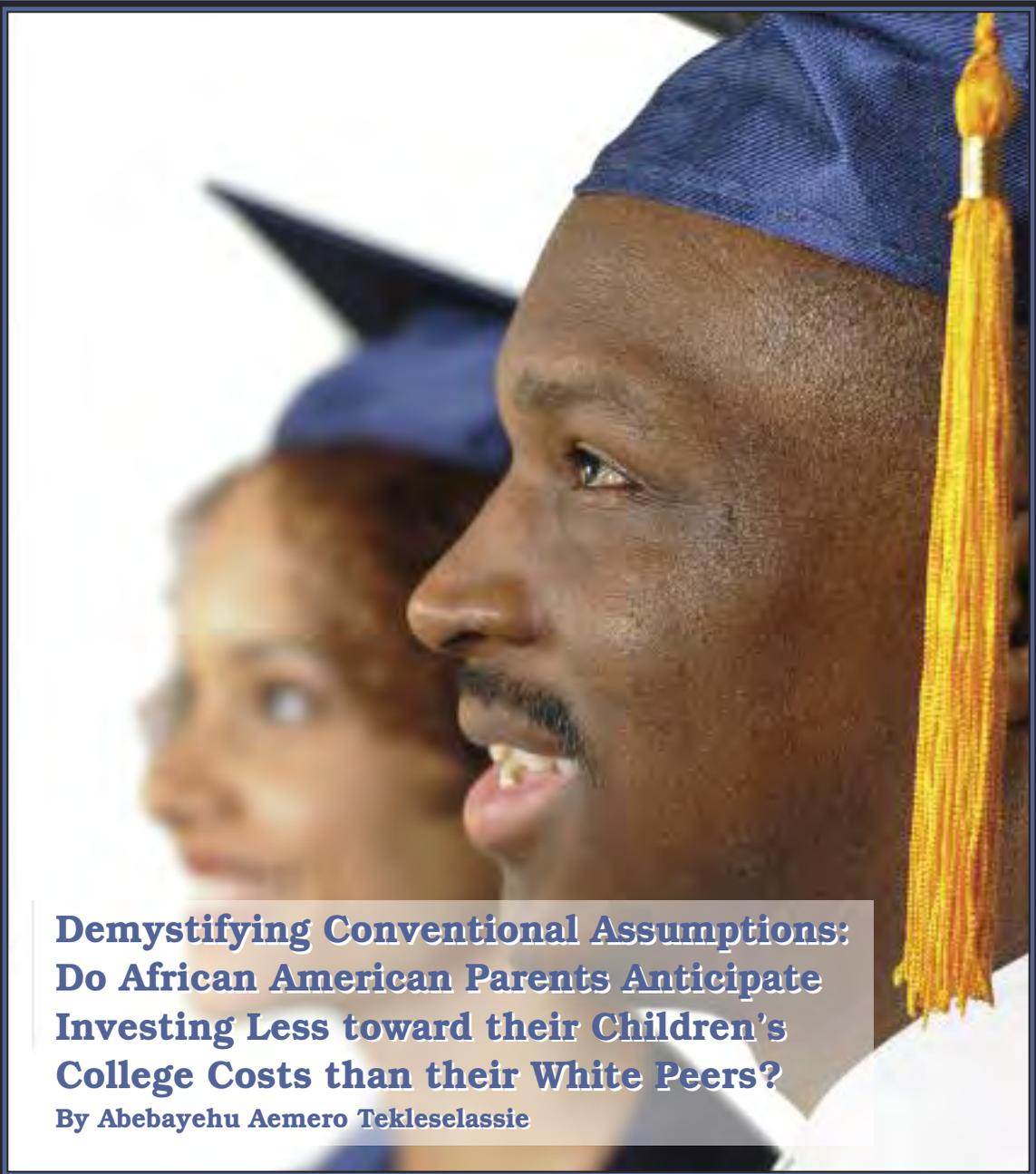


Journal of Student Financial Aid

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**Demystifying Conventional Assumptions:
Do African American Parents Anticipate
Investing Less toward their Children's
College Costs than their White Peers?**

By Ababayehu Aemero Tekleselassie



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Editor's Column:

A Sea Change in College Financing?

The way families pay for college has evolved over the years. Before the GI Bill in the 1940's, higher education was principally accessible to the well-to-do. Family income and assets and, for the fortunate, private and institutional scholarships covered the costs. The GI Bill transformed higher education and brought federal funds into the mix. In the ensuing decades federal aid, modest at first, grew rapidly – as did a burgeoning public higher education sector. Today college financing is a mix of family, institutional, private, and governmental resources. The constant throughout, however, has been the fundamental principle that parents are expected to help pay for their children's education as they are able.

When the rules for analyzing family ability to pay for higher education took shape in the 1950's, the current parent generation had grown up during the Great Depression and lived through World War II. Parents in the following generation were post-War babies who grew up in the Cold War. They were followed by a generation of parents shaped by the civil rights movement, Vietnam War, and women's liberation. The commitment to assuming the parental financing obligation seemed unwavering. Not so, it seems, today. Generation X, stereotyped by "What's in it for me?" may be challenging the basic assumptions.

Certainly the recent economic downturn and accompanying anxiety about income, job security, and conservation of assets have caused families to re-examine their financial priorities and commitments. The national unemployment and under-employment rates have eroded income and drained assets in many households—especially in some hard-hit areas of the country, such as the industrial Midwest.

Meanwhile college costs have continued to rise, outstripping growth in the cost of living and increases in salaries. Questions from the national media about whether higher education is worth the cost have added fuel to the fire. Higher college costs have brought in the aid applicant pool families with higher incomes. Parents who hold managerial and professional positions—accustomed to giving direction on the job—have become more demanding and combative on behalf of their students. Indeed, many believe that our society as a whole is generally more litigious and contentious.

Add to that the "helicopter parent" phenomenon. Many campus administrators must deal with hovering parents who try to address their children's every need—real and perceived—so that current students do not face failure. A student affairs colleague recently characterized "helicopter children" as being unable to deal with some of the challenges of college because their coping skills are underdeveloped.

Despite parents' concerns about their children's coping with college, there is a growing willingness to transfer significant burdens of college finance from themselves to their children. This may in part be a result of the economic downturn, but it also reflects the consumer-oriented, instant-gratification age. Although average consumer debt is now easing a bit and saving is increasing modestly, many families expect their children to bear significant—and perhaps ultimately unbearable—debt as beneficiaries of their own education. And the federal government, postsecondary institutions, and the lending community have been complicit in impelling that view forward by facilitating added student borrowing.

What's to be done?

Added transparency—now demanded by statute—may better help prepare parents for college costs and understanding their share in financing their children's education. Rather than resisting and complaining about new requirements, institutions should renew their efforts to help students and their families to understand the value of further education and the prospective return on investment of time, energy, and money. In so doing, we may regain the lost confidence of the general public, the media, and legislators.

We also need to renew our commitment to access. It is important to continue expanding college opportunities with grant funds, from not only governmental, but also institutional sources. Institutions can reexamine how they deploy limited grant resources—especially the distribution of merit-based scholarships—and redirect gift funds to students with financial need.

Institutions can also take seriously federal initiatives to limit debt in relation to graduates' prospective income. This applies to all of postsecondary education. It is just as reasonable to ask what total student loan debt and repayment burdens mean for the student completing a bachelor's degree at an elite college or flagship university as at a trade school. The question should be posed for students in graduate and professional schools as well.

Completion of the degree or certificate program is equally as important as access. Unfulfilled aspirations not only thwart a student's dreams, but also mean a loss of wages from the time spent on education and the likelihood of being unable to shoulder accumulated student loan debt. Student effort, educators' commitment, and financial resources are all lost—or at least diminished—by non-completion. We need to identify the causes of dropping out and address them by developing counseling and support services.

Postsecondary education is a cooperative effort. Helping all parties understand their roles, obligations, and expectations will be to everyone's benefit.

In this Issue

Abebayehu Aemero Tekleselassie, an assistant professor of educational leadership at the George Washington University, tackles a controversial issue by examining expected parental contributions toward college costs across racial lines in “Demystifying Conventional Assumptions: Do African American Parents Anticipate Investing Less than Their White Peers toward Their Children’s College Costs?”

Christopher D. Muir, associate director of financial aid and scholarships at Texas State University – San Marcos, where he is also a doctoral student in the Department of Geography, reports on a program designed to enhance the prospects of high risk secondary school students in competing for scholarships in “A Scholarship Workshop Program to Improve Underrepresented Student Access to Higher Education.”

Paul K. Sugrue, a professor of management science at the University of Miami’s School of Business Administration, seeks to define a way to make better use of institutional resources in “An Optimization Model for the Allocation of University Based Merit Aid.”

Joe Paul Case
Editor

Demystifying Conventional Assumptions: Do African American Parents Anticipate Investing Less toward Their Children’s College Costs than Their White Peers?

By Abebayehu Aemero Tekleselassie

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Some researchers and theorists tend to portray African American parents as lacking the cultural know-how to provide a supportive home environment that enhances college access and success for their children. Since contribution toward college costs is one tangible means by which researchers gauge parents’ commitment toward their children’s education, this study draws data from the National Longitudinal Study (NELS: 1988/2000) and examines how the amount and source of funding parents anticipate toward college costs differs between African Americans and Whites. Results indicate that while racial differences in anticipated college funding appear to favor Whites, who aggregately expect to contribute more than their African American peers, these differences disappear after families’ socioeconomic status is taken into account. Findings about college funding sources anticipated by the two racial groups are even more effective in demystifying existing stereotypes. Irrespective of socioeconomic status, the study shows that African American parents anticipate borrowing or using relatives’ contributions while White parents expect to draw on their savings or children’s earnings. The study concludes that the presumptions that African American parents are less committed to meeting their children’s educational costs are not only misleading, but are also deterrent to the pursuit of appropriate policy options that may redress existing inequalities in college funding between the two racial groups.

Despite concern over the financial disadvantage encountered by children from African American families, only few studies (e.g., Cha, Weagley & Reynolds, 2005; Churaman, 1992; Steelman & Powell, 1993) have directly examined parental contributions toward college costs by race. Compounding the paucity of literature, certain attitudes about African American parents’ roles and support toward their children’s education is negative. Early work (Badwin, Brown & Rackley, 1990; DuBois & Drill, 1911; Lewis, 1966; Moynihan, 1971; Tulkin, 1972) and some recent research (Ogbu, 2003; Fordham and Ogbu, 1986; Ogbu & Simons, 1998), for example, paint African American families as deviant, pathological, uncommitted, pessimistic, or crippled by failure to plan, support, and encourage their children’s education.

In part, such negative portrayal of African American parents supports the assumption that minority parents encourage welfare programs by forgoing personal responsibility. Since public funding for higher education represents one form of social welfare, Atkinson (1995) and Bobo (1988) argue that groups that readily benefit from those programs (such as African Americans more than Whites) may rely more on government aid, and correspondingly lack a sense of accountability for their children.

Drawing on similar assumptions (but from a different vantage point), other authorities argue that “group identification” explains why African Americans forgo personal responsibility in financing college education relative to Whites. According to this argument, African American families, regardless of whether

they experience directly the same economic deprivation or social disadvantage, closely identify and sympathize with the troubles that afflict their peers (Hasenfeld & Rafferty, 1989; Inness & Sittig, 1996). Given the strong ties that African American families maintain with their extended kinships, the church, and the Black community, Blackwell (1985) posits, upwardly mobile African Americans embrace liberal political views and expect to benefit from a governmentally provided financial aid program analogous to their counterparts from low-socioeconomic backgrounds. Similarly, impoverished Whites, as members of the privileged groups, might resist collective policies including governmentally sponsored financial aid packages—even when such orientation may limit their children’s upward mobility (Gilens, 2004; Steelman & Powell, 1993).

However, some scholars (e.g., White, 2007; Turley & Desmond, 2005; Wilson, 1980) provide a more positive account about African American families’ role in college funding arguing that, net of socioeconomic status, African American parents’ contribution toward college funding resembles those of White families. Using data from NPSAS (National Postsecondary Student Aid Study), Steelman and Powell (1993) found that, once the family’s background factors are controlled for, race is not a factor in the family’s contribution toward college costs. Converging with Steelman and Powell’s study, other researchers (e.g., Constantine & Perna, 2000; Solorzano, 1992) report that when the family’s socioeconomic status is accounted for, race is not a factor in the actual amount of parental contribution toward college costs.

In a related study, Turley and Desmond (2005) explore whether racial differences in parental contribution vary among married and divorced families. Despite the assumption that parental divorce depletes families’ resources, thereby reducing their potential to contribute toward college costs, these researchers report the opposite. They find that, for both minorities and majorities alike, once background factors are controlled for, children from divorced parents contribute as much as their peers from married families. What is more, among the lowest socioeconomic groups, African American divorced parents contribute more than their White peers toward their children’s educational costs.

Overall, the findings from these studies suggest that being a member of a minority racial group or having at-risk factor (e.g., being a divorced family) does not directly translate into lower parental financial commitment as the popular belief (or the deficit model) would have it.

Differences in Parental Contribution

The US higher education system is predicated on the premise that parents will cover a significant proportion of their children’s college costs (Lee, 1999). The theoretical rationale for parents’ contributions toward college costs is based on the assumption that the student is still a dependent child, and that parents have a (cultural) obligation to make such contributions—at least to the limit of their financial ability (Tekleselassie & Johnstone, 2004), through the attainment of a bachelor’s degree or until the child turns the age of 24 (Baum, 2001).

Indeed, with the recent shifts in financial aid policies in the U.S. (College Board, 2004), we can expect a trajectory of a growing parental contribution toward college costs in the foreseeable years. For example, tuition and other non-tuition expenditures have escalated at a significantly faster rate than financial aid, inflation, or wages (Kane, 1999; Institute for Higher Education Policy, 2001). The focus of federal aid has shifted toward the allocation of loans,

most of which are unsubsidized (Hearn, 2001; Heller, 2002b), thereby reducing grants and subsidized loans that needy families use in supplementing their contributions. In addition, many state governments have increased their allocations for merit-based aid programs at the expense of need-based aids (Baird, 2006; Heller, 2001).

As a result of these and many other changes, parents from all socioeconomic groups, except the most economically privileged groups (Choy, 1998), are being forced to shoulder a growing portion of their children's college costs. However, irrespective of socioeconomic status, African Americans are more likely than Whites to encounter social and economic disadvantages (Rothstein, 2004), such that the change in financial aid policies may limit African American parents' ability to contribute more than it limits this ability among their White peers. Still, it could also be that, given the educational and occupational disadvantage that African Americans encounter relative to Whites, African Americans consider a college education as a catalyst for their children's social and economic mobility (Carter, 2003). In other words, notwithstanding that African Americans command substantially less wealth (Orr, 2003) and income (Paulson & John, 2002) relative to Whites, African American parents may accept sacrifices in their lifestyle and therefore contribute toward their children's college costs as much as their White counterparts do.

The purpose of this study is to examine how African American and White parents differ in the amount and mode of contribution they anticipate making toward college funding for their children. This study attempts to answer the following questions:

1. To what extent do African American and White parents differ in terms of anticipated contributions to college funding? Do parental contributions depend on socioeconomic status?
2. To what degree do African American and White parents vary in terms of anticipated debt for college costs?
3. To what extent do African American and White parents differ in terms of dominant modalities (sources) of college funding? Do anticipated college financial modalities differ by parental socioeconomic status?

The focus of previous research (e.g., Steelman & Powell, 1993) is restricted to examining how racial differences in parental contribution exist when such contribution comes from parents' current earnings or savings, thereby leaving out contribution from borrowing. The current study fills this gap by including the expected debt amount that parents assume is tolerable to undertake toward their children's college costs. With rising college costs and declining financial aid in recent years (Heller, 2002), the present study proposes that the amount of debt parents assume toward college funding helps gauge their commitment level to make college education a reality for their children.

In addition, unlike previous research (e.g., Cha, Weagley & Reynolds, 2005; Churaman, 1992), the current study explores not only how the racial groups differ by the expected amount of financial contribution, but also by anticipated modalities of college funding. Knowledge of such modalities, as the study hypothesizes, depicts attitudinal differences in how parents perceive the roles of different agencies regarding college funding, including parents themselves, their children and relatives, and the government.

Finally, a limitation is in order. Since this study examines racial differences based on expected rather than actual parental contributions (owing in part to the limitations of the data used), the findings from this study might differ if actual parental contributions were examined. There is as much merit in knowing the anticipated parental contribution, however, as knowing their actual contribution. For example, parental planning to contribute toward college costs, particularly while their children are in high school, conveys a clear message that their children should attend higher education (Roderick, 2003; Smith & Fleming, 2006). Certainly, the benefit of such a message is very important for students who come from low-income backgrounds or are of first-generation college status.

Method

The primary data sources of the current study are the National Educational Longitudinal Study (NELS: 1988:2000 data files). The data were collected for eighth graders in the base year 1988 and in four successive waves, namely, 1990, 1992, 1994, and 2000, when the majority of the students were enrolled in grade 10, grade 12, their second year in college, and were college graduates and/or in the labor force, respectively. The target groups of the study comprise a subsample of 8,670 African American and White students who participated in the 1988 NELS study as eighth graders and took part in the successive waves of NELS studies.

Variables and Their Measures

The study drew four variables from parents' files: one variable as a proxy for a family's background, and three variables that serve as measures of parental commitment level toward their children's college costs.

The key variable measuring parental background characteristics is their socioeconomic status. In the NELS data, socioeconomic status (SES) refers to a composite index constructed using the following parent questionnaire data: father's education level, mother's education level, father's occupation, mother's occupation, and family income. For cases in which all parent data components were missing, student data were used to compute the base-year SES. Base-year socioeconomic quartile is the quartile into which parental socioeconomic status falls, with quartile one representing the lowest SES and quartile four signifying the highest.

The variables for gauging financial commitment by parents come from parents' files. Parents were asked: "Which of the following have you or your spouse/partner done to financially prepare for your teenager's education after high school?" While the NELS data include twelve types of college financing modalities, seven of the most common forms of parental strategies are included in the study, based on parents' reported frequencies. These are current earnings, savings, borrowing, child's earnings, relative's contribution, scholarship, and state/federal loans.

The items that assess the level of parents' financial commitment include the amount of financial resources that parents expect to spend on their children's education, and the amount of debt that parents think is tolerable for financing their children's college education. The particular item for measuring the amount of funding parents expect to pay toward college costs comprises six contribution levels (i.e., does not want to help; none; less than \$ 2,500; \$2,500-\$4,999; \$5,000-\$9,999; \$10,000 or more). Similarly, the item gauging parental

anticipated debt amount toward college costs comprises four contribution levels (i.e., none; less than \$2,500; \$2,500-4,999; \$5,000 or higher).

Data analysis

The study’s research questions explore how the racial groups differ by parents’ anticipated mode and amount of funding for college education and how these differences vary by the family’s socioeconomic status. Since all the variables are categorical in nature, in addition to percentages an independent *Chi-square* test is applied to determine whether differences exist by the variables included in the analysis.

Table 1a: Expected Contribution of College Costs by Black and White Parents

	African Americans	Whites	<i>n</i>	<i>X</i> ²
Does not want to help	12%	9%	657	5.6**
None	23%	15%	1,061	41.8**
Less than \$2,500	26%	25%	1,678	0.4
\$2,500--\$4,999	18%	20%	1,308	1.5
\$5,000-\$9,999	15%	17%	1,136	3.5*
\$10,000 or more	7%	15%	919	41.0**

p*<0.005; *p*<0.01

Source: National Educational Longitudinal (1988:2000) Data Files

Table 1b: Parental Expected Contribution toward College Costs, by Race and SES Quartile

Quartile 1	African Americans	Whites	n	X²
Does not want to help	20%	21%	232	0.2
None	36%	38%	424	0.3
Less than \$2,500	23%	22%	259	0.1
\$2,500--\$4,999	14%	14%	122	0.5
\$5,000-\$9,999	7%	6%	66	0.6
\$10,000 or more	5%	3%	38	3. 2
Quartile 2				
Does not want to help	7%	13%	183	7.5*
None	25%	18%	297	7.2*
Less than \$2,500	24%	32%	478	6.1
\$2,500--\$4,999	20%	22%	326	0.7
\$5,000-\$9,999	20%	10%	181	23.4*
\$10,000 or more	4%	5%	75	1.0
Quartile 3				
Does not want to help	13%	10%	180	2.2
None	12%	12%	214	0.2
Less than \$2,500	25%	32%	559	5.2
\$2,500--\$4,999	25%	23%	411	1.2
\$5,000-\$9,999	17%	17%	315	0. 8
\$10,000 or more	9%	8%	141	0.2
Quartile 4				
Does not want to help	2%	3%	61	0.3
None	6%	6%	126	0.4
Less than \$2,500	23%	35%	384	16.0
\$2,500--\$4,999	23%	17%	450	0.6
\$5,000-\$9,999	19%	26%	574	3.6
\$10,000 or more	17%	30%	665	12.6*

Note: Quartile 1 is the lowest level of socioeconomic status; Quartile 4 is the highest
* $p < 0.001$

Source: National Educational Longitudinal (1988:2000) Data Files

Results and Discussion

Table 1a explores whether Black and White parents differ in their anticipated financial commitments to postsecondary education. The data generally suggest that Black parents have a lower anticipated financial commitment compared to White parents. For example, more African American parents (23%) than Whites (15%) reportedly expect to contribute nothing toward their children’s college education. However, African American parents’ lower expectation for financial support relative to Whites may not reflect their lack of commitment. It may be that instead of being unwilling to provide support, Black parents’ lower expected contribution may well be a proxy for their limited financial resources relative to that of White parents. To test the validity of this assumption, Table 1b examines parents’ expected financial commitments by SES status. Results suggest no significant differences in parents’ expected financial commitments between African Americans and Whites within SES levels.

Overall, the data show that parents’ SES level influences their expected financial commitment, with parents from the higher SES groups expecting greater financial commitments than parents of lower SES groups. This finding provides evidence that the ability to pay, rather than willingness alone, determines how much parents expect to contribute toward their children’s postsecondary education. However, even among parents from the highest SES quartile, fewer African American parents (17%) than Whites (30%) expect to make high financial commitments (i.e., \$10,000 or more) toward postsecondary education. This result can be interpreted as high-SES African American parents’ lower financial commitment (i.e., unwillingness to support) compared to their White counterparts; however, it may also reflect African American parents’ lower cumulative wealth (Steelman & Powell, 1993) relative to White parents, even if they come from similar SES groups.

Parents’ assumed debt for college education

Parents’ expected amount of financial contribution is largely based on their present income and asset holdings, so it is far from being a comprehensive proxy for measuring their financial commitments. Thus, to gain further insight about parental financial obligations, understanding the degree to which parents are willing to take on debt and finance their children’s college education from their future earnings seems imperative. More specifically, since more African Americans than Whites are of low-SES (and thus have lower income and assets holdings), willingness to assume debt helps gauge racial differences in parental financial commitments.

Table 2: Parents’ Assumed Debt for College Education, by Race

	African Americans	Whites	<i>n</i>	<i>X</i> ²
None	20	35	1644	58.25*
Less than \$2,500	29	23	1180	10.41*
\$2,500-4,900	19	20	999	0.2
\$5,000 and more	32	22	1157	32.8*

**p*<0.001

Results in Table 2 suggest that among parents who expect a debt of \$5,000 or more toward college costs, African Americans constitute the majority (32%) relative to White parents (22%). In addition, among parents who report that they expect to contribute “none” toward their children’s college, White parents (35%) make the majority compared to African American parents (20%).

It should be noted, however, that although these data affirm African American parents’ commitment to incur debt toward their children’s college education—a commitment that goes over and above their financial means—they do not imply that White parents are unwilling or uncommitted to support college education for their children. Instead, the fact that White parents expect to borrow less for higher education relative to African American parents suggests White parents’ higher wealth and income, and therefore, their ability to finance college education without experiencing debt.

Parents’ assumed modes of college financing

Apart from measuring parents’ willingness and attitudes about college financing, race may play a role in determining the financial aid modalities that parents pursue. Table 3a describes seven most commonly used forms of parents’ college financing modalities: current earnings, savings, borrowing (other than state/federal loans), child’s earnings, relatives’ contributions, scholarships and state/federal loans.

Table 3a: Dominant College Financing Modalities Used by Black and White Parents

	African Americans	Whites	n	X ²
Current Earning	65%	77%	5,076	74.0*
Savings	47%	55%	3,595	26.0*
Borrowing	44%	35%	2,404	24.0*
Child's Earnings	39%	59%	3,701	140.0*
Relatives’ Contribution	34%	20%	1,448	101.0*
Scholarship	75%	63%	4,318	46.0*
State/Federal Loans	56%	47%	3,159	33.0*

* $p < 0.001$

Source: National Educational Longitudinal (1988:2000) Data Files

Table 3b: Dominant College Financing Modalities, by Race and SES Level

	African Americans	Whites	<i>n</i>	χ^2
Current Earnings	52%	51%	586	0.2
Savings	36%	27%	337	10.0*
Borrowing	40%	29%	363	13.5*
Child's Earnings	31%	43%	441	13*
Relatives' Contribution	36%	16%	245	56.0*
Scholarship	72%	60%	719	16.0*
State/Federal Loans	59%	47%	573	13.0*
Quartile 2				
Current Earnings	74%	73%	1,134	0.5
Savings	44%	48%	727	1.0
Borrowing	42%	39%	588	1.0
Child's Earnings	44%	56%	821	14.0*
Relatives' Contribution	35%	20%	338	31.0*
Scholarship	77%	20%	1,056	8.0*
State/Federal Loans	59%	55%	828	2.0
Quartile 3				
Current Earnings	69%	81%	1,434	21.0*
Savings	50%	57%	1,017	3.0
Borrowing	48%	36%	660	13.0*
Child's Earnings	43%	62%	1,072	32.0*
Relatives' Contribution	34%	22%	417	18.0*
Scholarship	78%	68%	1,245	10.0*
State/Federal Loans	52%	51%	904	0.7
Quartile 4				
Current Earnings	71%	87%	1,921	31.0*
Savings	66%	69%	1,514	0.4
Borrowing	48%	37%	793	8.0*
Child's Earnings	39%	64%	1,366	36.0*
Relatives' Contribution	28%	20%	447	4.0
Scholarship	69%	58%	1,298	7.0
State/Federal Loans	51%	38%	853	12.0*

Note: Quartile 1 is the lowest level of socioeconomic status; Quartile 4 is the highest

* $p < 0.001$

Source: National Educational Longitudinal (1988:2000) Data Files

The data reveal a clear pattern that, on one hand, shows African American parents' tendency to rely on loans, grants, scholarships, and asking relatives for contributions. On the other hand, White parents are inclined to use current earnings and savings as well as their children's contribution.

Two explanations may account for these results. First, since more White than African American parents come from higher income groups, the White parents' tendency to use current earnings and savings portrays their ability to finance their children's college education from their present disposable income and assets. By contrast, African Americans, who lack resources, may therefore rely more heavily on borrowing, loans, grants, and scholarships.

Second, African American parents' tendency to seek grants, scholarships and loans suggests that their awareness of eligibility influences their choices. Prior research (e.g., Heller, 1997) indicates that compared to Whites, African American parents and their children qualify for these modes of financing because of their lower incomes. In addition to these factors, parental values regarding who should pay for college education also influence the financial modalities that African American and White parents choose. Differences in these values clearly emerge, particularly as we assess how African American and White parents consider children's earnings as part of their modes of financing. The data show that a significantly higher percentage of White parents (59%) compared to African American parents (39%) consider their children's earnings as a mode of college financing.

Table 3b provides further analysis of variations in the parents' mode of financing by socioeconomic level. The overall trend seems that, for parents in low SES groups (mainly the first quartile), the most common forms of college financing include borrowing, contributions from relatives, scholarships, and loans. By contrast, parents in the upper SES groups (mainly the third and the fourth SES quartiles) largely rely on current earnings and savings. For example, 71% of the highest SES African American parents, compared to 52% of their lowest SES counterparts, report using their current earnings as a mode of college financing. Among parents who report borrowing or using loans, however, parents from the lowest SES groups constitute the majority both for African Americans and Whites. Furthermore, 59% of African Americans and 47% of Whites from the lowest SES groups expect to use federal loans, compared to 51% and 38% of the highest SES African American and White parents, respectively.

Interestingly, however, even after disaggregating the data by family SES, racial variations in anticipated mode of college funding remain unchanged. For example, at all SES levels, African American parents tend to anticipate using borrowing, relatives' contributions, and governmentally sponsored financial aid (scholarship, grant, and state/federal aid), while White parents tend to expect using current earnings, savings, and their children's earnings. To some degree, exceptions to these patterns are the lowest SES groups in which African Americans (36%) outnumber Whites (27%) among parents who anticipate using their savings. However, that more low SES African American parents rely on using their savings than their White peers does not imply that African American parents possess better potential for savings. Indeed, irrespective of socioeconomic status, White parents enjoy higher levels of income and command more assets than do African American parents (Steelman & Powell, 1993). Instead, this finding may suggest that African American parents from low-socioeconomic status are committed, despite their modest incomes, to accept and expect sacrifices in their lifestyle and save for their children's college education.

Conclusion

Based on data from the National Educational Longitudinal Study (NELS: 1988/2000), the present research explores how parents of African American and White youths vary by anticipated amount and mode of college financing. The study's findings provide evidence that challenges some conventional assumptions about African American parents' contribution toward college costs.

First, as much as racial differences by anticipated financial contribution appear to favor Whites who, on aggregate, exceed African Americans by the amount of funding they expect to contribute, these differences disappear after accounting for family socioeconomic status. More importantly, when parental anticipated debt—a proxy for parental contribution from sources other than current earnings and savings—is considered, African American parents expect to contribute more than White parents do. This raises the question: Why do African American parents anticipate taking on more debt for college than their White peers?

Two alternative explanations are apparent. First, from previous research (e.g., Paulsen & John, 2002), we know that, net of socioeconomic status, African Americans amass less cumulative wealth than Whites, thereby limiting their potential to save. Under the circumstances, more African American parents than their White peers expect to take on debt in order to offset the financial need that their children encounter in going to college. Second, the experiences of most African American parents are such that their children's chances of occupational success and comfortable life style are extremely limited if they are not able to attain considerably more education than their parents (Ainsworth-Darnell & Downey, 1998). Hence, African American parents' willingness to take on more debt than Whites to finance college education might reflect how much they value higher education as an instrument for redressing past and present economic and social inequalities.

Second, in addition to the amount of money that parents expect to contribute, the data suggest differences in anticipated types of financial modalities by racial and social groups. As the data show, on the one hand, social class membership separates the financial modalities anticipated by families from lower and upper socioeconomic status. Thus, irrespective of race, parents from the lowest socioeconomic status anticipate using borrowing, government loans, scholarships, and grants, while their peers from upper socioeconomic status expect to use their savings and current earnings.

On the other hand, attitudinal and cultural differences appear to explain why the racial groups differ by proposed modalities of college funding. For instance, even after discounting socioeconomic status, more African Americans than Whites anticipate using borrowing, loans, scholarships, grants and relatives' contributions, whereas more Whites than African Americans expect to use their current earnings, savings, and children's earnings.

The question then becomes: Do the proposed financial modalities symbolize African Americans' reliance on government funding, thereby suggesting their abdication of personal responsibility as the deficit model would have it? True, irrespective of socioeconomic status (including the upper socioeconomic groups), more African Americans than Whites anticipate to use scholarships and state/federal loans, thereby leaving an impression that African Americans depend on government funding more than Whites do. However, this assumption does not appear to hold. Converging with other studies (Steelman & Powell, 1993), this finding instead might suggest that because of their social

and economic inequalities, African American parents define the educational progress of their children as markers of success, correspondingly welcoming government aid, regardless of their income and education levels.

The insufficiency of the deficit model argument as explanation for differences in college financing modalities employed by African American and White parents is even more evident when considering children's earnings. Relative to their White peers, African American parents discount the use of children's earnings. In other words, as much as they endorse the use of a governmentally sponsored financial aid program as a way of offsetting college costs, African American parents do not believe that they should shrink from personal responsibility. Hence, for African American families, providing support for their children is "doing the right thing" (Steelman & Powell, 1993, p.240).

Overall, results from the current study contradict prior research (Ogbu, 2003; Fordham & Ogbu, 1986) that asserts that African American's minority status and their disadvantage in material and financial resources undermine their cultural capital, that is their ability to create an educationally supportive environment for their children. Implicitly, these theorists contend that minority populations such as African Americans do not have the cultural know-how in order to succeed in upper-level academic institutions (Bourdieu, 1977a; Fordham & Ogbu, 1986). Because of past social and economic inequalities, slavery, discrimination, and structural disadvantages in the African American experience, these theorists argue, African American parents generate attitudes and norms inconsistent with the dominant achievement ideology, thereby creating a sustained distrust of schooling that spawns low effort, low commitment, and low material and financial support for children's education.

Indeed, the findings that African American parents are willing to contribute toward college costs despite their humble accumulated wealth and income defies the deficit model's assumptions of equating background risk status with the family's support processes as if one necessarily determines the others. In other words, the deficit model ignores families' unique survival histories, interactions, specific schooling contexts and child rearing practices that define parental values and resources in materializing college access and success for their children (Clark, 1983; Mickelson, 1990).

Beyond demystifying assumptions and norms that misconstrue the African American parents' experience in college funding, the present study provides insights that help improve research, policies, and practices in targeting, marketing, and distributing financial aid for low-income and minority students. For example, since existing research suggests that low-SES and African American families do not have as much awareness about financial aid as White and high-SES families (Laura, Chen & Chapman, 2003; Kao & Tienda, 1998), future research is needed that compares the types of financial aid modalities parents propose vis-à-vis their knowledge or information about financial aid. In light of this, for example, redesigning student financial aid marketing system and increasing access to information for minority and low-SES parents not only helps to raise the awareness of these families regarding existing financial aid programs, but also allows financial aid advisors design aid packages that fit the unique needs and circumstances of these families.

As reported earlier, since the findings of the current study depend on anticipated amount and mode of college funding by parents, additional research is needed to assess the actual contributions and mode of funding by parents whose children are already enrolled in college. Combining results from

such a study with findings reported here will provide a more robust picture of the strategies that parents may employ in planning for college costs and the efficacy of those strategies in reducing the financial barriers children may encounter when they apply for college.

In the end, it is important to reiterate the study's findings that although African American parents plan to contribute toward college costs as much as White parents, the sacrifices that African American parents make are often greater mainly because African Americans amass less accumulated wealth than Whites (Conley, 1999; Orr, 2000). Redressing such inequities in college funding suggests that financial aid policies should, in part, become preferential for academically ready but financially needy minority families whose abilities to pay for college have greatly been diminished due to past and present economic inequalities. True, such preferential policies imply that African Americans deserve more access to college funding than Whites, and many contend that such policies generate legitimate contentions germane to equity and efficiency arguments (Atkins, 1995; Baum, 1999; Creech & Davis, 1999). However, as we know from other research, financial limitations significantly reduce college access and success even for academically prepared students from committed families (Advisory Committee on Student Financial Aid, 2001). In addition, the effects of these limitations on the college-going behavior of minority students are greater than those of majorities (Levine & Niddifer, 1996; Heller, 1997; Paulsen, M. & John, E., 2002). Hence, notwithstanding the debates, carefully designed preferential policies that target financial aid for academically ready but economically disadvantaged African American families not only ensure college access for these youths, but also serve the broader purposes of higher education in America: the training of a productive workforce, the realization of individual potential, and the assurance of social justice (Tekleselassie & Johnstone, 2004).

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An Optimization Model for the Allocation of University Based Merit Aid

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The allocation of merit-based financial aid during the college admissions process presents postsecondary institutions with complex and financially expensive decisions. This article describes the application of linear programming as a decision tool in merit based financial aid decisions at a medium size private university. The objective defined for the model is to maximize the quality of the incoming class as measured by average combined SAT scores. The approach involves using the yield rates from the previous year for each combination of SAT score and merit aid award while eliminating from consideration combinations for which insufficient data is available. Parameter estimation is based upon 2006 data and the results of the model are measured against 2007 data. It is shown that the modeling approach yielded a higher average SAT scores when applied to actual 2007 admissions data.

Student financial aid available in higher education can be divided into two distinct categories: university-based aid and external aid. External funds are all other sources of funds which are not university based, including funds from all federal, state, and other governmental agencies as well as any private sources. University-based aid derives from funds controlled solely by the university and may come from endowments or from operating budgets. It is not unusual for a private university to allocate close to one half of their gross tuition revenue to university-based financial aid. University aid funds can be further classified as designated and undesignated. As the name implies, designated aid is targeted for specific categories of students, while undesignated funds are directed toward the general student population. Undesignated university-based aid can be awarded to students based on their need, talent, or their academic merit. This article is concerned with the allocation of university-based undesignated aid awarded on the basis of academic merit only, which will be referred to as merit-based aid. Merit-based financial aid is also referred to as “non-need based” aid or more generally as “tuition discounting.”

On a macro level, the institution budgets a dollar amount for merit aid, whereas on a micro level, financial aid decision makers must allocate among accepted students the aid that has been budgeted. Before the allocation decisions are made, the objective in allocating the merit aid dollars must be articulated. Once the objective is determined, quantitative measures can be selected to measure the achievement of the objective. For example, if the objective is to improve the academic quality of the incoming class, then SAT score, class rank, or GPA can be selected as possible measures of achievement. These quantitative outcome measures give the decision makers at the micro level guidance for allocation decisions. Although a clearly stated objective and quantifiable outcome measures give guidance to the decision makers, the issue of how much merit aid to allocate to each student still remains.

The allocation of merit aid, that is how much merit aid to allocate to each student, is the topic of this article. This review assumes that the objective in allocating merit aid is to attract higher quality students in order to enhance the

overall academic stature of the incoming class and therefore the institution. Achievement of this objective is limited by the size of the class to be recruited, the availability of merit aid funds, and the availability of qualified applicants. For example, recruiting a class of 1,000 students by offering full tuition scholarships to all applicants with SAT scores above 1500 is most likely not feasible. In the first place, there probably would not be a sufficient number of applicants with SAT scores in that range. In the second place, there would most likely be insufficient funds to support this strategy, since the financial aid budget is normally derived from tuition revenue.

This article applies to the aid allocation decision the technique of constrained optimization. The approach is to formulate the problem as a mathematical programming problem that can be readily solved on a personal computer. Although the problem formulation is simple and straightforward, the challenge is in extracting the data required for the model and in interpreting the results. This study uses a subset of actual admissions data, which provides a clear example of how such a model could be successfully implemented at any university faced with merit aid allocation decisions.

Background

The prediction of the yield rate, or the probability that an individual admitted student will enroll, is a major issue in the implementation of any decision model involving financial aid strategies. Earlier studies have examined the relationship between the yield rate and observable characteristics of applicants and of the institution for both a large selective university, as in Ehrenberg and Sherman (1984), and a smaller liberal arts college as in Moore, Studenmund, and Slobko (1991). In the examination of the elasticity of the fraction who accepted offers of admission at Cornell University, Ehrenberg (1984) concluded that financial aid plays an important role in the decision process, while Moore et al. (1991) estimated a positive relationship between the amount of the scholarship and the decision to enroll at Occidental College. While both studies examine the elasticity of the yield rate, neither provides guidance to the decision maker in improving the decision process. In fact, Ehrenberg (1984) cautions against the implementation of their results pending several years of observation of the required parameters, noting that the external environment facing universities is changing rapidly.

The application of mathematical programming models as decision making tools is pervasive in the field of business. In a now classic article, Robert Dorfman (1953) presented a clear non-algebraic exposition on the usefulness of mathematical programming in the solution of economic and business problems. The clarity of the examples in this article generated a slew of classic case studies in operation research courses. The use of linear programming as a decision tool in the financial aid decision was presented by Sugrue, Mehrotra, and Orehovic (2006). Specifically, the authors outline an approach to maximize the total net revenue while considering budget, student recruitment pools, SAT averages, and the enrollment targets as constraints.

The objective in making financial aid decisions varies with the type of aid awarded. Overall, the objective of the university may be to maximize net tuition revenue to the university as in Sugrue et al. (2006). In the case of need-based aid, the objective may be to minimize the financial strain on the families of the applicants. In the case of merit aid the objective is more generally associated with the overall quality of the incoming class. Need-based and merit aid awards are contrasted by Ness and Noland (2007), although their study

focuses on public funds. The objective of non-need based grants can be considered to enhance the enrollment management goals of the institution as described by Redd (2000).

In recent years there has been a move away from merit aid toward more need-based aid in some universities. Grossman (1995) described this trend among elite universities, making the argument that merit aid results in less money for needy students. However, one could argue that increasing academic stature is clearly not a major objective of the Ivies and Massachusetts Institute of Technology, which already sit atop the rankings of undergraduate universities. For middle-tier institutions, improving academic stature to rise in the rankings may be a major objective.

The Linear Programming Model

The objective of the model described here is to maximize the average combined SAT score of enrolled students, while satisfying constraints on the availability of students within specified SAT ranges, the total amount of funds allocated to merit aid awards, and the target size of the incoming class. Linear Programming, a mathematical approach to solving constrained optimization problems, will be used to do so. The approach involves expressing the problem in terms of a set of linear functions which define the objective and the limits on the set of possible solutions. The first step is to define a set of variables whose values are to be decided. These variables are referred to as the decision variables. Once these variables are defined, the objective and each constraint can be expressed as a linear function of these decision variables. Solving a linear programming problem involves selecting values for the set of decision variables, within the set of feasible solutions, which either maximize or minimize the objective.

The decision variables for this problem formulation are the number of admitted students in a specific SAT range who are offered a specific merit aid award. Decision variable x_{ij} is defined as follows:

x_{ij} : the number of students in SAT group j offered merit aid amount i

If there are n ranges or groupings of SAT scores and m distinct merit aid award levels, then there would be $(n*m)$ decision variables. Each possible solution to the problem will consist of the assignment of a value to each of the $(n*m)$ decision variables.

The combination of an SAT range and a merit award level will result in a percentage or probability of applicants offered that combination enrolling. These probabilities vary with the SAT and award levels. For example, higher range SAT applicants would have a lower probability of enrolling for a given aid level than lower range applicant would. Equivalently, students in the same SAT range offered greater amounts of financial aid would have a higher probability of enrolling than those offered less aid. This probability of enrolling for a given combination of SAT range and merit award is y_{ij} and will be referred to as the yield rate. The yield rate y_{ij} is defined as follows:

y_{ij} : the probability that applicants with SAT scores in range j and offered merit aid at level i will enroll

Unlike the decision variables x_{ij} , the values of y_{ij} must be known before the model can be solved. Such variables are called parameters of the model.

Each of the n groupings of SAT scores has a representative value (this could be the mean, midpoint, or median of the class). The representative value of each of the n SAT ranges is referred to as s_j , where s_j is defined as:

s_j : the representative value of the SAT range j

This representative value is computed from the SAT scores of all applicants who fall into the respective SAT range. These values would be known prior to merit awards decisions being made.

Each of the m merit award levels have a specific award level which will be referred to as a_i . Therefore the definition of a_i is as follows:

a_i : the merit award level in dollars for merit group i

Merit aid awards are typically given in set dollar amounts and therefore the number of groups is typically not large.

The expected value of the number of applicants who will accept the financial aid offer and enroll for a particular combination of SAT and award levels, is therefore $(x_{ij} * y_{ij})$, the number of students in SAT class j who are offered award i times the yield rate for that same combination. The expected value of the size of the class is the sum over all possible combinations of each of these individual expected values, or:

$$\sum_{i=1}^n \sum_{j=1}^m x_{ij} y_{ij}$$

If the target class size is C , the first constraint on values which can be assigned to the decision variables is:

$$\text{Constraint 1: } \sum_{i=1}^n \sum_{j=1}^m x_{ij} y_{ij} = C$$

This constraint states that the expected value of the class size must equal a predetermined value C .

There is almost always a limit on the total funds that can be disbursed for financial aid awards. In this model it is assumed that the total budget for merit aid awards is B . The expected expense of each award amount, i , for a given SAT level j , is the number of offers extended in that amount times the probability of student applicant in the given SAT range accepting the award times the amount of the award b_i . Therefore the total expected amount spent on all merit aid is the sum of the expected values of each award category. This total expectation can be expressed as:

$$\sum_{j=1}^m \sum_{i=1}^n b_i y_{ij} x_{ij}$$

If this total expected expenditure on merit aid cannot exceed the budget for merit awards, B, then the second constraint on values which can be assigned to the decision variables is:

$$\text{Constraint 2: } \sum_{j=1}^m \sum_{i=1}^n b_i y_{ij} x_{ij} \leq B$$

This constraint states that the expected value of all merit award offers made cannot exceed the merit award budget, B.

Prior to merit awards being extended, the number of applicants who have been accepted in each SAT range is known and therefore the number of offers extended in each range cannot exceed this number of accepted applicants. The number of accepted applicants in each range is p_j which represents the pool of candidates available for merit aid awards in SAT range j. The total offers made in each award category to students with a given SAT range cannot exceed the number of applicant accepted in that group. This can be expressed as:

$$\text{Constraints 3 thru } 3+n: \sum_{i=1}^n x_{ij} \leq p_j$$

One of these pool constraints would be required for each of the n SAT groupings.

In this model, the objective in assigning values to the decision variables will be to maximize the mean SAT score for the enrolled class. The mean of the enrolled class can be approximated by using a weighted mean of the SAT ranges using the expected number of students to enroll in each SAT range. If the representative SAT value for range j is s_j then the partial weighted mean of the SAT for range j can be expressed as:

$$\sum_{i=1}^n s_j y_{ij} x_{ij}$$

Summing the partial weighted means over all SAT groups and dividing by the sum of the weights, which is the size of the class C, gives an expression for the average SAT score for all enrolled students:

$$\text{Objective Function: } z = (\sum_{j=1}^m \sum_{i=1}^n s_j y_{ij} x_{ij}) / C$$

The objective function is a linear function of the decision variables for a set value of the class size C. The complete statement of the linear programming model is to:

Maximize:

$$z = (\sum_{j=1}^m \sum_{i=1}^n s_j y_{ij} x_{ij}) / C$$

Subject to:

$$\sum_{i=1}^n \sum_{j=1}^m x_{ij} y_{ij} = C$$

$$\sum_{j=1}^m \sum_{i=1}^n b_i y_{ij} x_{ij} \leq B$$

$$\sum_{i=1}^n x_{ij} \leq p_j \text{ for all SAT ranges, } j$$

$$x_{ij} \geq 0 \text{ for all } i \text{ and } j$$

In this model the target class size, C , the merit aid budget, B , and the pool sizes of admitted students in the various SAT groupings, p_j 's, are all known with certainty at the time that values for the decision variables must be set. The $(n \times m)$ array of yield rates for the combinations of SAT grouping and merit award level must be estimated.

Appreciation of the Model

The model was applied to a subset of actual data for the 2007-2008 academic year. The subset was chosen from all accepted students by selecting only student applicants who received four distinct merit award levels. These four merit award levels constituted 62.4% of the merit aid awarded in 2007. The merit award levels are shown in Table 1.

Table 1: Merit Aid Award Levels

Award Level (i)	Award amount (b _i)
1	\$0
2	\$11,000
3	\$16,000
4	\$24,000

The SAT scores of the accepted students were divided into six groupings and are shown in Table 2. This table also shows the number of students accepted in each SAT group, or the p_j 's.

Table 2: Pool Sizes of Accepted Students by SAT scores

SAT Group (j)	SAT range	Group Mean (s _j)	Pool size (p _j)
1	below 1100	1023.15	240
2	1101-1200	1161.76	602
3	1201-1300	1263.16	1,667
4	1301-1400	1352.38	1,835
5	1401-1500	1443.44	921
6	1501-1600	1532.36	157

The actual yield rates observed for each combination of SAT group and Award Level are shown in Table 3. The number of awards offered is also shown in this table. It should be noted that in general these yield rates show the relationship between Award Level and SAT score that one would expect, i.e. as student quality increases, yield rates decrease and as award levels increase, yield rates increase.

Table 3: Yield Rates by SAT Group and Award Level for 2007

SAT Group (j)	Award Level (b _i)			
	1	2	3	4
1	.458 (240)	.182 (11)	(0)	.667 (3)
2	.272 (393)	.244 (209)	.111 (9)	0.000 (3)
3	.248 (880)	.251 (438)	.235 (349)	.222 (9)
4	.159 (441)	.252 (345)	.226 (665)	.318 (384)
5	.090 (144)	.237 (38)	.161 (193)	.190 (584)
6	.056 (18)	.000 (2)	.071 (14)	.115 (157)

The number of awards offered appear in parenthesis for each combination of SAT score and award level

The budget amount, B, was the actual amount expended on the enrolled students who were given the four award levels listed above, which was \$12,967,710. The enrollment target, C, was the actual number of students who enrolled at the same four award levels, which was 1,281.

The 4x6 array of decision variables for this problem appears below:

$$X = \begin{bmatrix} X_{11} & X_{12} & X_{13} & X_{14} & X_{15} & X_{16} \\ X_{21} & X_{22} & X_{23} & X_{24} & X_{25} & X_{26} \\ X_{31} & X_{32} & X_{33} & X_{34} & X_{35} & X_{36} \\ X_{41} & X_{42} & X_{43} & X_{44} & X_{45} & X_{46} \end{bmatrix}$$

For example x_{23} represents the number of admitted students with an SAT score in the range 1201-1300 and offered a merit award of \$11,000. In the 4x6 array of yield rates is shown below:

$$Y = \begin{bmatrix} y_{11} & y_{12} & y_{13} & y_{14} & y_{15} & y_{16} \\ y_{21} & y_{22} & y_{23} & y_{24} & y_{25} & y_{26} \\ y_{31} & y_{32} & y_{33} & y_{34} & y_{35} & y_{36} \\ y_{41} & y_{42} & y_{43} & y_{44} & y_{45} & y_{46} \end{bmatrix}$$

Y_{23} represents the probability that a student in the SAT range 1201-1300 who is offered a merit award of \$11,000 will enroll.

The arrays below show the actual yield rates and the number of observations for 2007. These yields and offer numbers are also shown in Table 3.

$$\begin{bmatrix} .458 & .272 & .248 & .159 & .090 & .056 \\ .182 & .244 & .251 & .252 & .237 & .000 \\ .111 & .235 & .226 & .161 & .071 & \\ .667 & .000 & .222 & .318 & .190 & .115 \end{bmatrix} \begin{bmatrix} 240 & 393 & 880 & 441 & 144 & 18 \\ 11 & 209 & 438 & 345 & 38 & 2 \\ 0 & 9 & 349 & 665 & 193 & 14 \\ 3 & 3 & 9 & 384 & 584 & 157 \end{bmatrix}$$

Eliminating cells with low observation numbers (less than 100), which is equivalent to eliminating that choice from consideration, gives the following yield rate matrix:

$$Y = \begin{bmatrix} .458 & .272 & .248 & .149 & .090 & & \\ & .244 & .251 & .252 & & & \\ & & .235 & .226 & .161 & & \\ & & & .318 & .190 & .115 & \end{bmatrix}$$

Now that all the parameters have been defined, the linear problem can be stated as:

Maximize:

$$Z = .37x_{11} + .25x_{12} + .25x_{13} + .17x_{14} + .10x_{15} + .22x_{22} + .25x_{23} + .27x_{24} + .23x_{33} + .24x_{34} + .18x_{35} + .34x_{44} + .21x_{45} + .14x_{46} \quad *$$

Subject to:

$$.458x_{11} + .272x_{12} + .248x_{13} + .159x_{14} + .090x_{15} + .244x_{22} + .251x_{23} + .252x_{24} + .235x_{33} + .226x_{34} + .161x_{35} + .318x_{44} + .190x_{45} + .115x_{46} = 1,281$$

$$2684x_{22} + 2761x_{23} + 2772x_{24} + 3760x_{33} + 3616x_{34} + 2576x_{35} + 7632x_{44} + 4560x_{45} + 2760x_{46} \leq 12,960,000$$

$$x_{11} \leq 240$$

$$x_{12} + x_{22} \leq 602$$

$$x_{13} + x_{23} + x_{33} \leq 1667$$

$$x_{14} + x_{24} + x_{34} + x_{44} \leq 1835$$

$$x_{15} + x_{35} + x_{45} \leq 921$$

$$x_{46} \leq 157$$

$$x_{11}, x_{12}, x_{13}, x_{14}, x_{15}, x_{22}, x_{23}, x_{24}, x_{33}, x_{34}, x_{35}, x_{44}, x_{45}, x_{46} \geq 0$$

The array on the left below shows the actual offers made to the fall of 2007 and the resulting average SAT score using 2007 actual yield rates. The array on the right shows the solution of the linear programming problem defined above with the resulting average SAT score again using 2007 actual yield rates.

$$\begin{bmatrix} 240 & 393 & 880 & 441 & 144 & & & & & & \\ & 209 & 438 & 345 & & & & & & & \\ & & 349 & 665 & 193 & & & & & & \\ & & & 384 & 584 & 157 & & & & & \end{bmatrix} \begin{bmatrix} 9 & 602 & 1667 & 0 & 0 & & & & & & \\ & 0 & 0 & 1167 & & & & & & & \\ & & 0 & 0 & 0 & & & & & & \\ & & & 668 & 921 & 157 & & & & & \end{bmatrix}$$

Average SAT = 1285

Average SAT = 1313

The aid allocation decisions based upon the model resulted in a 28 point increase in SAT score. The model result incorporated the 2007 yield rates shown previously, while to the decision makers these yield rates were yet unknown. In a real sense the allocations made by the model were under conditions of perfect information. In actuality, at the time the allocation decisions are being made the yield rates for the class being admitted (in this case the 2007 class) are not known. Therefore the input parameters of the model should be limited to information which was variable at the time the decisions must be made. One option is to use the yield rates from the previous year. Shown below are the yield rates from 2006 for the same combinations of SAT ranges and merit award levels:

$$\begin{bmatrix} .331 & .267 & .222 & .153 & .080 & & \\ & .259 & .219 & .192 & & & \\ & & .361 & .257 & .183 & & \\ & & & .336 & .204 & .137 & \end{bmatrix}$$

Using these 2006 yield rates in the model gave the following optimal solution and average SAT score:

$$\begin{bmatrix} 132 & 602 & 1667 & 0 & 0 & & \\ & 0 & 0 & 0 & & & \\ & & 0 & 1283 & 921 & & \\ & & & 552 & 0 & 157 & \end{bmatrix}$$

Average SAT = 1296

The actual 2007 yield rates were applied to the above solution set to compute the average of 1296. The linear programming solution resulted in a solution which had a mean SAT score 11 points higher than obtained by the actual allocations.

Applying 2007 yield rates to a solution based upon 2006 data shows other advantages of the linear programming solution. Table 4 below summarizes the differences between the actual allocation and the LP solution. Although the LP solution resulted in 12 fewer students enrolled, it generated \$969,560 more in net tuition revenue.

Table 4: Comparison of LP model Solution and Actual Allocations

	Actual Allocation	LP Model Solution
Average SAT	1285	1297
Enrollment	1281	1269
Tuition Revenue	\$39,352,756	\$39,012,614
Merit Aid Expenditure	\$12,967,710	\$11,658,008
Net Revenue	\$26,385,046	\$27,354,606
Financial Impact of LP Model		\$969,560

Discussion and Conclusion

The allocation of merit-based financial aid during the college admission process presents award makers with complex and financially expensive decisions. Without a clearly stated objective, the common approach is to spend until all allocated funds are gone and then to ask for more. Applying linear programming to this class of problems presents a simple, straightforward, and disciplined technique for efficiently making allocation decisions. The example presented in this article showed a potential impact of \$1 million in a process involving the allocation of \$13 million. Most businesses would not hesitate to adopt such a competitive advantage, particularly when the cost of implementation is negligible.

The challenge in the implementation of such a decision aid is not in the availability of data or access to computer technology, but rather in training decision makers to understand and trust the power of this technique. Although the approach of using linear programming is straightforward and effective, the approach is extremely sensitive to yield rate estimation and the estimation of yield rates is not as straight forward. Yield rate estimation is a fertile area for future research.

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A Scholarship Workshop Program to Improve Underrepresented Student Access to Higher Education

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This study examines the effectiveness of a scholarship workshop program to better prepare low socio-economic and minority students to compete for collegiate scholarships. The study involves 1,367 high risk 9th to 12th grade students in Texas. Analysis of the pre- and post-tests, using a t-test for dependent variables, indicates a statistically significant improvement in the relevant knowledge of workshop participants. As evidenced by this analysis and other data, the workshop program is very successful in educating high risk students about the steps necessary to develop a competitive scholarship application that can increase their chances of accessing a higher education.

Lack of access to higher education among underrepresented populations is a growing concern in the United States. Challenges to access can take a variety of forms. Researchers such as De Oliver (1998) assert that the location of some universities is not demographically neutral and basic geography limits access for certain minorities. Other researchers examine this issue in terms of both budgets and capacities (Shulock & Moore, 2005), as well as an interactive process between the K-12 system and the admission policies of universities (Yun & Moreno, 2006).

This study addresses access from a socioeconomic perspective as it relates to competitiveness for academic scholarships. Specifically, this research assesses a scholarship workshop program's effectiveness in educating underrepresented student populations about how to maximize their scholarship opportunities and increase their potential to access a higher education.

Scholarship reviewers—whether on a scholarship committee for a university, foundation, or local organization—may read hundreds of scholarship applications during an evaluation period. While a significant number of these applicants may have earned the minimum academic criteria for consideration (i.e., minimum SAT/ACT scores, high school rank, etc.), many applications are dismissed because the subjective components of the applications were prepared ineffectively. Examples of these components include, but are not limited to: 1) poorly developed essays; 2) resumes that do not quantitatively and qualitatively communicate a student's academic, extracurricular, volunteer, and work accomplishments; and 3) ineffectual letters of recommendation. Due to inequalities and the lack of adequate resources available to high schools in low-socioeconomic communities, students attending such institutions are less likely to be prepared to access higher education (Jones et al., 2002). Such students often lack access to guidance counselors (Lee & Ekstrom, 1987) who not only provide academic advice but assistance with preparing admission and competitive scholarship applications. This challenge is further compounded by institutional merit aid, including scholarships, which is often awarded on the basis of standardized test scores, rigorous programs of study, and extracurricular activities that tend to reward students from affluent high schools (Long & Riley, 2007).

Despite this disadvantage, measures can be taken, both internal and external to the K-12 education system, to better assist underrepresented students to obtain scholarship funds and improve their chances of accessing a higher education. The Office of Financial Aid and Scholarships at Texas State University-San Marcos undertook a program to achieve this goal. The program assisted economically disadvantaged students who were at least minimally eligible to compete for academic scholarships in terms of objective criteria (e.g., test scores) by teaching them how to develop effective resumes and essays to better compete for scholarships.

Texas State University secured a \$52,000 Public Benefit Grant from Texas Guaranteed (TG) to develop and conduct a scholarship workshop program targeted at high school students located in low socio-economic communities in Texas. In addition to the TG grant, the program received an in-kind gift from The College Board. The following three questions guided the development of the scholarship workshop and the research study:

1. To what extent does the scholarship workshop increase the knowledge of disadvantaged students with respect to the completion of a competitive scholarship application packet?
2. What is the difference in learning between those students attending the on-site and online workshop sessions?
3. To what extent does the workshop help students to better develop a scholarship essay?

Literature Review

Considerable research has been conducted with respect to underrepresented students' access to higher education (De Oliver, 1998; Griffin et al., 2007; Long & Riley, 2007; Shulock & Moore, 2005; Yung & Moreno 2006). While the Supreme Court in 2003 upheld the use of race in university admission policies, which one can argue is a component of access for minority students, underrepresented populations still encounter financial challenges with respect to paying for a college education (Long & Riley, 2007). These barriers include high unmet need with respect to aid packages, merit scholarships structured to the advantage of students from affluent communities, and the prospect of significant loan indebtedness (Long & Riley, 2007).

As the cost of obtaining a higher education continues to be framed within the context of increasing college costs and reductions in financial assistance funding (Institute for Higher Education Policy, 2006), students who come from a low-socioeconomic background will perceive attending an institution of postsecondary education as increasingly difficult. Long and Riley (2007) posit that this barrier to access is due to financial assistance being diverted from the disadvantaged to middle- and upper-income families. Their assertion is supported by the Institute for Higher Education Policy's (2006) report, *Convergence: Trends Threatening to Narrow College Opportunity in America*, which asserts that increasing tuition costs and cuts in financial aid programs will be to the detriment of disadvantaged populations with respect to their access opportunities to a college education. As a result, those with high need who apply for financial aid must either rely more heavily on alternative loans (which generally have high interest rates, less advantageous repayment arrangements, and cosigner requirements) or not matriculate. As Long and Riley (2007) proffer, "low-income students and students of color are especially likely to face substantial unmet need even after taking into account all available grants and loans" (p. 39).

Texas colleges and universities employ a variety of approaches to assist and encourage underrepresented students to attend college. For example, the federally-funded TRIO programs are employed to improve recruitment and retention among minority and first-generation students (Department of Education, 2007). These types of programs, as well as those initiated by individual universities and other organizations interested in improving access to higher education, involve partnering with the K-12 system and joint public and private sector efforts. However, such partnerships have been “constrained by a long history of structural inequality in high minority schools” (Jones et al., 2002, p. 4).

While some efforts do address this structural disparity, many still operate under the misconception that “K-12 schools have sufficiently addressed past inequalities in providing URMs [underrepresented minorities] access to college preparatory education” (Jones et al., 2002, p. 3). Given these shortcomings and the impact they have on the educational lives of underrepresented populations, more innovative ways must be developed to assist students in accessing a higher education. One option that has not been addressed within the literature is teaching underrepresented students how to be more competitive for academic scholarships, which can assist in meeting the “substantial unmet need,” discussed by Long and Riley (2007).

The Study

The first step in implementing this study was to identify high schools located in low socio-economic communities. To make this determination the study used the *Economically Disadvantaged (ED)* indicator available via the Texas Education Agency’s website at www.tea.state.tx.us. In those instances where individual school data were not available, the study utilized the *ED* indicator for the school district in which a high school was located. The *ED* measure is calculated by summing “the students coded as eligible for free or reduced-price lunch or eligible for other public assistance, divided by the total number of students” within a particular school or district (Texas Education Agency, 2005).

Students identified as economically disadvantaged tend to have higher dropout and lower graduation rates (Community Action Network, 2006). Given these factors, the study’s target threshold for high schools was an *ED* level of 60% or greater, indicating that at least 6 in 10 students will not only have a high risk of failing to succeed in high school, but also of accessing a higher education.

Texas high schools meeting the *ED* criterion were identified, contacted and asked to participate. In addition, workshops were conducted at high schools that did not meet the *ED* criterion of at least 60%. These sessions were undertaken at the request of high school officials who had heard about the program from officials at targeted high schools and wanted their students to participate in and benefit from the program. As a result, 10 (18%) of the sessions were conducted at high schools with an *ED* indicator below the specified 60% level. Of these 10 workshop sessions, all were delivered at high schools with an *ED* level of at least 30% (i.e., 3 of every 10 students were at high risk). Despite this accommodation to meet the requests of high school educators, 46 (82%) of all workshops were held at high schools meeting the study’s 60% *ED* threshold criterion.

The sessions ranged in length from 60 to 90 minutes per presentation, depending on the time allotted by each host school. Each session provided attendees with the following learning modules: 1) general overview of the scholarship application, and selection processes; 2) development of a unique and compelling essay; 3) writing a resume that truly attests to one's accomplishments from both a quantitative and qualitative perspective; and 4) approaches/strategies for securing excellent letters of recommendation. All sessions also included a component on searching for scholarship opportunities and applying for financial assistance.

The essay portion of the program dealt with what is arguably the most challenging portion of a scholarship application.

Data Collection

Two instruments were disseminated to all workshop participants to collect data on the program. The first was a general self-report assessment completed by the participants that was used to determine the effectiveness of the presenter and presentation materials as well as attendees' overall attitudes with respect to the program. This instrument also collected attendee demographic information.

The second was a pre-test and a post-test employed to determine the extent to which the participants learned from the program. This learning assessment took into consideration the main learning modules addressed by the workshop through test questions such as: 1) Name three important components that should be included in a competitive scholarship resume; 2) Name four common mistakes students make when developing a scholarship essay; and 3) From the perspective of the scholarship review committee, what purpose do your letters of recommendation serve?

A third instrument was developed to determine the effectiveness of the essay portion of the program—the essay being perhaps one of the more challenging components of an application. This session dealt with the construction of a compelling essay. Due to the limited time available to conduct each session, the emphasis was placed on developing the introductory paragraph, which provides the initial structure and direction for the remainder of the essay. This assessment followed a pre- and post-test format; where students were asked to write an introductory essay paragraph based on their choice of one of three essay topics before receiving the training, and again at the conclusion of the workshop. The essays were subsequently graded on a scale of 1 to 10 by individuals who serve on scholarship committees at the university level, and a *t*-test was performed on the results.

These three instruments provide a generalized perspective of the effectiveness of the program. A confidence level of .05 was used for the pre- and post-tests in both the general learning and essay areas.

Results

General assessments were collected for 1,367 (54.7%) of the approximately 2,500 students who participated in the workshop programs. Among students who completed the survey, 87.3% were Hispanic-American and 4.7% African-American. Also, 50.5% of student respondents indicated that they would be first-generation college students. These data, along with the *ED* indicator of the high schools, suggest that the workshop programs were delivered to the population intended: underrepresented students from low socio-economic communities.

With respect to the overall benefit of the workshop program, 78.1% of students rated it as good or excellent. Session presenters were rated by 83.3% of attendees as being good or excellent with only 1.2% rating presenters as being poor. Perhaps of greatest importance in evaluating the success of the workshops is the extent to which participants believed the sessions had better prepared them to complete a competitive scholarship application. When asked to rate the workshop programs in this regard, 80.5% determined that the workshops had prepared them in a good or excellent fashion. Lastly, 78.8% of attendees rated the helpfulness of the workshop handouts (presentation slides, resume examples, essay examples, etc.) as good or excellent, while less than 1.1% rated the materials as poor.

The pre- and post-test learning assessment was completed by 839 (33.6%) of all participants. Subjects were asked to complete 6 questions. The maximum score for each question, depending on its difficulty, ranged from 1 to 4. The 6 scores for each participant were then summed to produce a single measure (variable) of understanding; the value for which ranged from 0 to 15.

The mean score of participants who completed the pre-test was .92 as compared with a post-test mean of 6.62. In order to determine whether this difference was statistically significant, the study used a *t*-test for dependent variables with a .05 level of significance. As indicated in Table 1, with 838 degrees of freedom, the difference in the means is considered statistically significant with a $p < .0001$. In other words, there was a statistically significant increase in the knowledge of participants as measured by the mean scores between the pre- and post-tests.

Table 1: Differences between Pre- and Post-test Scores: General Learning in Workshop

Variable	Degrees of Freedom	Test Statistic	Standard Error Mean	P Value
Test Scores	838	-51.588	.111	.0001

$n = 839$

A second analysis of pre- and post-tests focused on attendees from those schools with an *ED* indicator of only 60% or higher. By eliminating those students from communities with an *ED* indicator of less than 60%, it is possible to assess the learning of those students who were within the original target population (i.e., extremely high-risk students) of this study. Over 90% of this subgroup consisted of Hispanic and African-American students, and approximately 65% were first-generation. The analysis yielded statistically significant results at $p < .0001$. Gains between the pre- and post-tests demonstrate that the workshop was successful in teaching all students, regardless of the type (i.e., *ED* level) of high school attended.

A similar *t*-test was also calculated for the pre- and post-tests administered to determine the difference in composition of introductory essay paragraphs prior to and after the workshop modules had been delivered. The pre- and post-tests means were .41 and 2.91, respectively. The *t*-test for dependent variables with 144 degrees of freedom indicates that the difference in the mean scores is not

statistically significant at $p < .056$. Thus, the results (Table 2) fall within the normal range of expected differences. In other words, in the case of students at schools within an *ED* indicator of at least 60%, the increase in test scores between the pre- and post-tests appear not to be the result of students having attended the scholarship workshop.

Table 2: Differences between Pre- and Post-test Scores: Essay Paragraph Session

Variable	Degrees of Freedom	Test Statistic	Standard Error Mean	<i>p</i> Value
Test Scores	144	-14.274	.175	.056

$n = 145$

The study also endeavored to determine whether the learning varied in a statistically significant manner with respect to the onsite (at the high schools) or online sessions. Since all presenters were able to interact with participants and deliver the same materials, it was assumed that the learning would be similar between both groups. The mean increase (gain) in learning among onsite participants was 5.70 and 5.79 among online attendees—a difference of .09. A *t* test for independent variables was performed for equal variances as Levene's Test produced $F = 2.319$ with $p = .128$. The results (Table 3) reflect that the difference in learning between the onsite and online groups was not statistically different at $p < .870$, and, therefore, both online and in-person sessions are equally effective in producing learning among students.

Table 3: Differences between Pre-and Post-test Scores: Online and In-Person Sessions

Assumption of Variance	Degrees of Freedom	Test Statistic	Standard Error	<i>p</i> Value (Two-Tailed)
Equal	837	-.164	.562	.870

$n = 839$

From a qualitative perspective, comments were collected from workshop participants. While some comments were critical of the workshop (e.g., workshop should be longer, more examples are needed, etc.), the feedback from attendees and high school faculty was overwhelmingly positive. After transforming the comments into separate codifiable units for analysis, the ratio of positive to negative remarks was 20 to 1.

Conclusion

The data from the pre- and post-tests on general learning suggest that the scholarship workshop used at Texas State University is an effective tool for increasing the knowledge of high school students with respect to completing a competitive scholarship application. Also, the results obtained from the general assessment indicate that the program's format, materials, and perceived benefit were well received by students. This is an important component to successful learning when considered within the broader context of social judgment theory, which addresses how presenters—viewed as outsiders—may be perceived by and negatively impact the learning of underrepresented student populations. Thus, this scholarship workshop program provides a practical means of better educating disadvantaged students about how to become more competitive for scholarship funds and potentially increase their access to a higher education.

The study results also demonstrate no statistically significant differences in the learning (knowledge gains) between onsite and online participants. This finding has practical significance in that it is more economically feasible to deliver online sessions than to provide an onsite representative for each participating high school. Online sessions offer a viable means of delivering more sessions to more students at a lower cost. This method improves the ability of financial aid professionals to assist a greater number of underrepresented students in learning more effective methods to access a higher education.

One measure that did not yield as positive of a result was the development of improved essays as a result of the session. This finding may be indicative of the limited time permitted at each high school to conduct the essay component. In future iterations of this workshop program, in-depth sessions will be developed to focus solely on assisting students in writing scholarship essays, as opposed to including this important component as one of five modules offered in a 60 to 90-minute workshop.

Once sufficient time has passed, longitudinal data on workshop participants will be collected and analyzed to determine whether workshop participants are more successful in winning scholarships and accessing higher education. Such research could better illustrate the value of these workshops in improving college access and, if a positive relationship is found, increase the likelihood of greater public/private investment in this kind of program to assist a greater number of the country's disadvantaged and underrepresented high school students.

Overall, the program has been successful in targeting underrepresented high school populations, increasing their knowledge of the components of a competitive scholarship application and perhaps improving their access to postsecondary education.

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Statistical data should be summarized in the text. Figures and tables must be clear, comprehensible, and used only when they add to the presentation or when they reduce the need for a lengthy discussion in the manuscript. Particularly complex research (including statistical terminology) should be explained in an understandable way for readers not fully acquainted with research methodology and analysis. Complicated graphs should be submitted with actual plotting points indicated.

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An issue article should address a position or a perspective on a student aid policy or topic. The headings should reflect the organization of the article. The author presents the issue in the introduction, which is not headed. Unlike the components of a research article, the sections of an issue article are arranged by relationship. The sections display the perspectives of others, the evidence and logical argument, and positive and negative implications. The conclusion should suggest next steps or otherwise finalize what has been introduced and argued earlier.

Style Manual

Questions of style should be referred to the most recent edition of the Publication Manual of the American Psychological Association (APA). Although APA style has been historically oriented toward research, the APA stresses the adaptability of the style to more theoretical manuscripts.

Authors unfamiliar with APA style should read the first chapter of the manual, "Content and Organization of a Manuscript," from which the primary points of these guidelines are derived.

Copies are available in most college and university bookstores or may be ordered by calling the Order Department of the American Psychological Association at (800) 374-2721.

Footnotes

Footnotes are generally avoided because they distract the reader. Reference citations are never footnoted, but are included in a reference list. Whenever possible, information germane to an article should be integrated within the text. Necessary supporting documentation may be included as an appendix. Table notes, author identification notes, and copyright permission footnotes are acceptable and are addressed in the APA Publication Manual.

References

The use of the APA reference is simple and straightforward. All references cited in the text must be listed alphabetically by author in a reference list at the end of the article. Since this list must enable the reader to locate the works cited, the reference data must be correct and contain all of the details necessary for identification and library research.

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Submission of Manuscripts

Articles should be submitted in Microsoft Word or WordPerfect format via e-mail to jpcase@amherst.edu or on a CD mailed to Joe Paul Case, Director of Financial Aid, P.O. Box 5000, B-5 Converse Hall, Amherst, MA 01002-5000. Indicate in the cover e-mail or on the CD which format was used. If you wish to submit your article in a different format, please contact Linda Conard at NASFAA, (202) 785-6958.

Manuscripts should be in upper and lower case. All copy, including indented material and references, should be double-spaced and generally no longer than 15 pages (including tables, figures, and references). Each page after the first page should be numbered. The title of the article should appear at the top of the first page of text.

Since the Editorial Board has a blind review policy, the author's name should not appear on any page of the text. A cover sheet should include the title of the manuscript, author's name, institutional affiliation, mailing address, phone number, e-mail address, and the date the manuscript is submitted. Authors are also asked to include on the cover page a two- to three-sentence anecdotal description of the manuscript.



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Articles will be reviewed for substance and presentation. Please refer to “Writing and Organizing Manuscripts” above. The Editorial Board will consider the relevance of the article to current needs in the field, the significance of the idea or usefulness of the information, appropriate nature of any research method and/or logic of presentation, as well as clarity, syntax, and style, although these are the responsibilities of the author.

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